UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

James A. K. Miyamoto, P.E.
Deputy Operations Officer
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
Joint Base Pearl Harbor Hickam, HI 96860

**Re: Disapproval of Red Hill Administrative Order on Consent ("AOC") Scope of Work ("SOW") Deliverable for Sections 6 and 7 – Work Plan/ Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility ("Facility"), May 4, 2016**

Dear Mr. Miyamoto:

The U.S. Environmental Protection Agency ("EPA") and Hawaii Department of Health ("DOH"), collectively the "Regulatory Agencies", have reviewed the *Work Plan/ Scope of Work, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility* submitted by the U.S. Navy ("Navy") and Defense Logistics Agency ("DLA") on May 4, 2016 (hereafter referred to as "the Work Plan").The Regulatory Agencies are disapproving the Work Plan, pursuant to AOC Sections 7(b)(d). **The Navy and DLA are required to resubmit the Work Plan with revisions within 30 days of receipt of this letter as pursuant to 7(b) of the AOC.**

The work to be conducted under Sections 6 and 7 of the SOW is critical for bounding the risk to drinking water resources from past and potential future releases at the Facility. To meet this objective, the Navy and DLA will need to gather sufficient data and conduct analysis of the data to establish likely groundwater flow directions beneath and around the Facility allowing for prediction of contaminant movement. Achieving this objective in a way that secures approval from the Regulatory Agencies as well as builds stakeholder acceptance, will enable this analysis to be used to defensibly predict probability of impact to drinking water resources from potential future releases.

The Work Plan does not adequately describe the work to be performed in order to meet the objectives of sections 6 and 7 of the AOC SOW. The Regulatory Agencies require Navy and

DLA to revise the Work Plan pursuant to the comments below. In addition, the Navy and DLA must address the detailed comments included in attachment A (Regulatory Agencies Detailed Technical Comments and Observations) and attachment B (External Subject Matter Expert Comments).

**Comments**

1) **The work described in the Work Plan submitted is not structured in a manner that supports an iterative and scientifically robust approach for achieving the AOC objective of adequately understand the subsurface conditions for the purposes of characterizing consequences of releases from the Facility.** The Work Plan must be revised to adequately describe the process for implementing the AOC requirements in a manner that allows for sufficient review, by the Regulatory Agencies and external subject matter experts, ofmethods, decisions and assumptions to be used to develop the required products outlined in sections 6 and 7 of the AOC. For example, the workplan should include the following:
    a. description of the process for constructing initial site conceptual site model
    b. description of the process for compiling all relevant historic data and creating data summary report
    c. description of the approach proposed to assess the quality of historic information
    d. description of the proposed content and format of deliverables
    e. description of the limitations and sensitivity of existing groundwater model
    f. description of the approach proposed to make improvements to the numeric flow model
    g. description of the approach proposed to assess degradation rates of fuel in the subsurface under the range of potential release scenarios.
    h. description of the approach that will be used to gather Regulatory Agency and external subject matter input at important decision points in the process of implementing the work
    i. description of the approach proposed for assessing adequacy of sentinel network
    **j.** description of the process to be used to update the groundwater protection plan

2) **The conceptual site model presented in the Work Plan is an incomplete representation of existing data and does not adequately acknowledge uncertainty related to the conditions around the Red Hill Facility.** Instead of presenting an inadequate conceptual site model in the workplan, the workplan should be revised to describe the process and approach that will be used to create a defensible initial conceptual site model, and subsequent updates to the conceptual site model, that acknowledges uncertainty and is based on all data available for the site. The Regulatory Agencies suggest the Navy and DLA submit for Regulatory Agency approval, a stand-alone plan for developing and updating the conceptual site model rather than combining it in the overall workplan.
3) **The conceptual site model needs to evaluate NAPL movement in the saturated and unsaturated zones for the purposes of risk characterization.** The workplan for the conceptual site model needs to describe an approach for evaluating the potential

migration rates and directions for NAPL movement from all areas of the facility. Estimation of NAPL migration from potential releases identified as part of the Section 8 work is needed to characterize the consequences of potential future releases. In order to do this, the plan will need to describe how the lithology data will be used to estimate the probable NAPL migration direction, the fraction of NAPL that is expected to be immobilized in the vadose zone, and the fraction of released NAPL expected to reach the water table either as LNAPL or dissolved phase contamination. The Work Plan should further provide a plan for assessing the potential migration of LNAPL on the water table.

4) **The Work Plan needs to include a deliverable that adequately describes the existing data available to be used for the modeling effort and assesses the adequacy of the data to achieve objectives of the AOC.** The Navy and DLA should compile all existing data, including but not limited to groundwater chemistry data, water table elevation data, precipitation data, groundwater production data, aquifer test data, boring logs, tank barrel logs, and other relevant data into a standalone deliverable for the Regulatory Agencies' review and approval. This document should not only present the existing data, but assess the quality and limitations of the data for the purposes of satisfying the objectives of the AOC.
5) **The Work Plan does not describe how groundwater flow paths will be determined since groundwater gradients and groundwater flow direction are not always coincident.** Anisotropy, formation heterogeneity, and subsurface structures can result in groundwater flow paths not adequately characterized by groundwater gradient. The Work Plan needs to specify how these factors will be evaluated and their impact on groundwater flow patterns assessed.
6) **The Work Plan does not adequately describe how the flow model will be updated, recalibrated, assessed for sensitivity, and ultimately utilized as a tool to inform future work to be performed.** The workplan should be revised so that the model refinement effort is transparent and provides appropriate opportunity for Regulatory Agency and external subject matter expert involvement. During this effort, the Regulatory Agencies expect that numerous professional judgements will be exercised. The workplan should describe how these professional judgements and other assumptions will be incorporated and documented as the model is refined. Given the model's importance in future work to be performed under the AOC, the modeling effort should strive to achieve a team approach that involves individuals with demonstrated expertise and experience. The desired expertise is describe further in the attached Regulatory Agency Detailed Technical Comments - Attachment A.
7) **The Work Plan does not adequately describe how the assessment of attenuation rate of fuel in the vadose zone and saturated zone will be evaluated as part of this effort.** Navy and DLA should present a plan for collecting and analyzing data to evaluate and bound the likely rate of fuel attenuation in the subsurface from the range of releases that could occur at Red Hill. Understanding the likely range of attenuation rates is important for both the development of the conceptual site model and for the fate and transport modeling effort. Adequate understanding of attenuation of hydrocarbon relative to releases at the Facility is important for accurate characterization of the consequences of releases.
8) **The workplan does not sufficiently describe how an adequate sentinel monitoring well network will be established for early detection of contaminants from the Red**

**Hill Facility that may threaten drinking water production facilities.** The Navy and DLA shall present a plan for evaluating and establishing a sentinel network for the existing groundwater production points that will provide sufficient certainty that any contaminants approaching these production points can be detected adequately and in a timely manner to allow for execution of contingency measures in a manner that will prevent contaminated groundwater from entering the drinking water distribution networks.

9) **The workplan does not describe how the results of the groundwater investigation and resulting modeling will be used to establish risk based decision criteria.** The Navy and DLA shall present a plan to integrate the risk assessment of Section 8 with the data collected and models generated by Section 7 to establish risk based criteria for the Groundwater Protection Plan and any emergency response plans that are developed to mitigate or prevent impact of groundwater resources by a fuel release.
10) **The workplan does not present an adequate process to assess the quality, sensitivities, and potential uncertainties of the current groundwater model that Navy and DLA are proposing to update in order to satisfy the objectives of the AOC.** Navy and DLA shall submit a groundwater model evaluation plan that describes a process for review of the existing groundwater model in a manner that identifies uncertainties and describes options for reducing uncertainty. This evaluation should include an evaluation of the benefits of additional aquifer tests to further reduce uncertainty. The Work Plan should also analyze how the most recently collected data fits the previously calibrated groundwater model.
11) **The Work Plan does not adequately describe the content and organization of deliverables, project schedules, and opportunities for Regulatory Agencies and external subject matter expert review of assumptions and information used to develop deliverables.** The Navy and DLA shall provide an outline of deliverables to be produced including an outline of groundwater monitoring reports, investigation reports, modeling reports, and other relevant reports. This outline of deliverables shall identify the tables, graphs, charts, and figures proposed for these deliverables. The Navy and DLA shall also provide a project schedule describing the work to be performed under sections 6 and 7 of the AOC SOW including a schedule for activities including, but not limited to data collection events, interim deliverables, final deliverables, comment periods, and decision meetings. In developing this schedule, the Navy and DLA shall make a good faith effort to reduce as much as possible the duration of time between sample collection and data reporting to the Regulatory Agencies.

In order to expedite the work to be performed, we strongly suggest that this Work Plan be simplified. It should focus on the work to be performed and reserve the presentation of historical background data and other information to the individual deliverables outlined in the revised Work Plan. An acceptable work plan will need to describe the approach to creating the deliverables, describe the process for making decisions related to data quality and data accuracy, describes the expected content and format for the deliverables, and describes the schedule for creating the deliverables.

We are available to discuss our comments in more detail. Please contact us with any questions. Bob Pallarino can be reached at (415) 947-4128 or at [ HYPERLINK "mailto:pallarino.bob@epa.gov" ] and Steven Chang can be reached at (808) 586-4226 or at [ HYPERLINK "mailto:steven.chang@doh.hawaii.gov" ].

Sincerely,

Bob Pallarino
EPA Red Hill Project Coordinator

Steven Chang, P.E.
DOH Red Hill Project Coordinator

Enclosures

cc: Captain R. D. Hayes
Mr. Stephen Turnbull, U.S. Navy